Coastal Research and Climate Services

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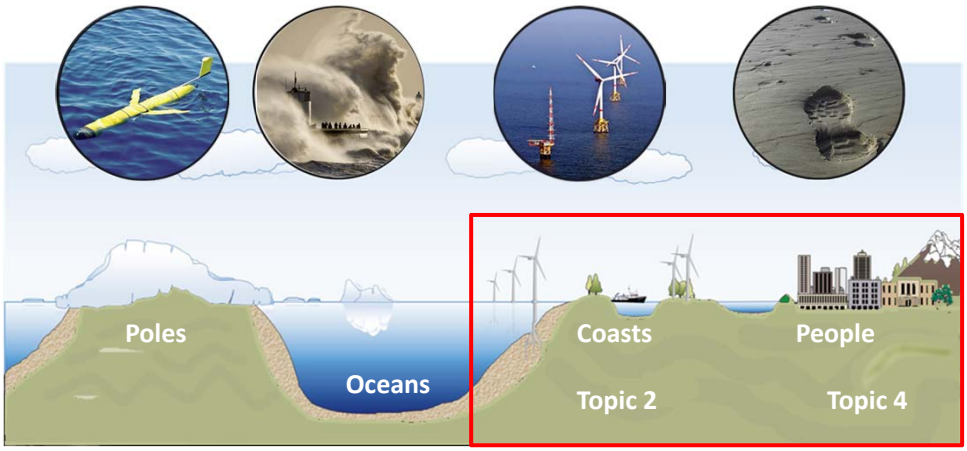
Centre for Materials and Coastal Research

HZG contribution to PACES II

Polar Regions **A**nd **C**oasts in the Changing **E**arth **S**ystem (PACES II)



interactions between climate change, natural environments and human systems

Scope and challenges

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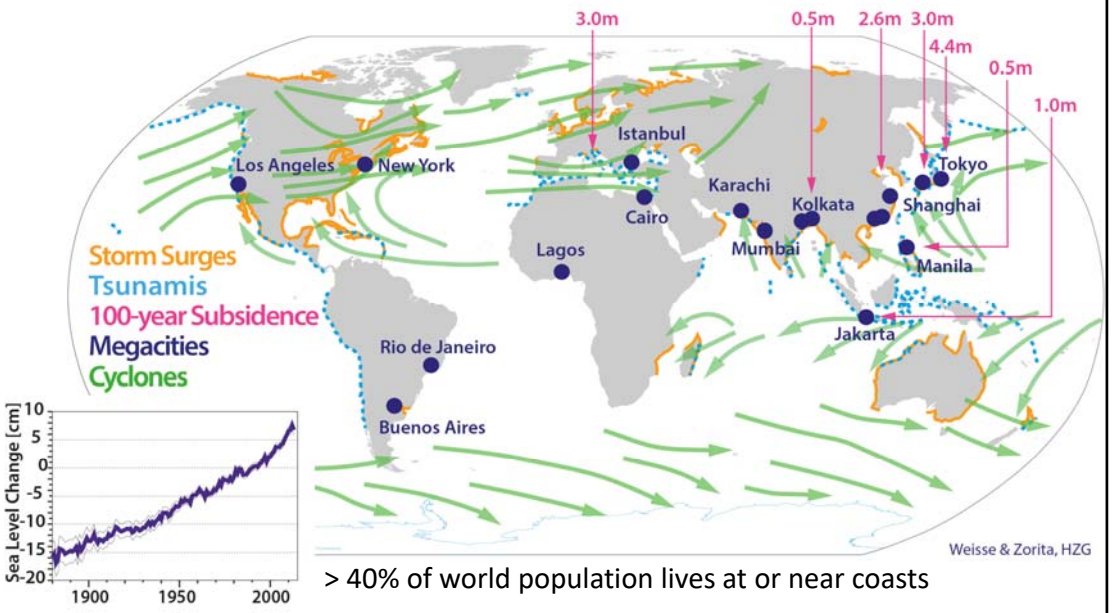

> 40% of world population lives at or near coasts

Scope and challenges

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transition zones – change in three spheres of the natural system

important to human and societies´ futures

science-based services key to low-risk conversion and adaptation

challenges (ICSU, 2010, 2011):

- observing systems to manage global and regional change
- improved and useful forecasts
- anticipate/communicate need for adaptation
- innovate in technological, policy, social responses

Profile and exponents

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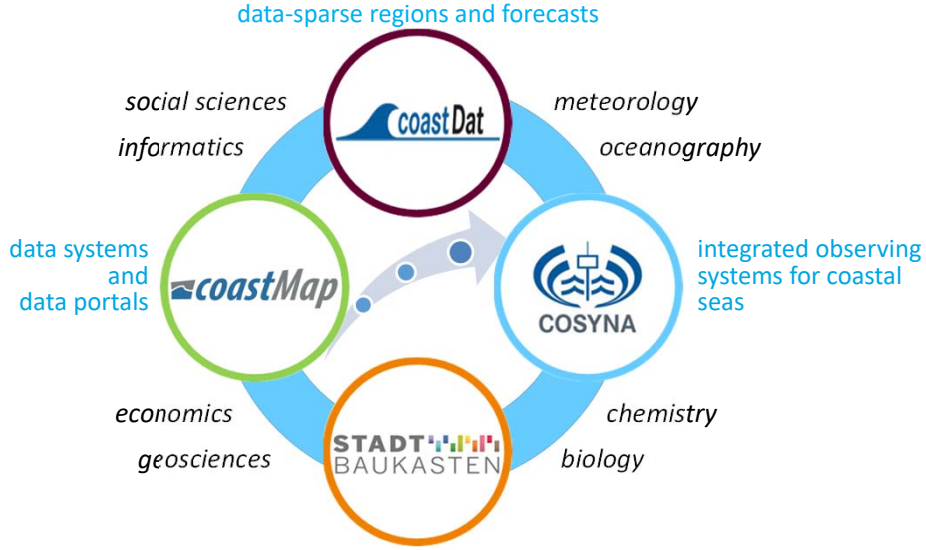
model-based hindcasts in data-sparse regions and forecasts



services for sustainable adaptation to global and regional change impacts

Embedding in PACES II

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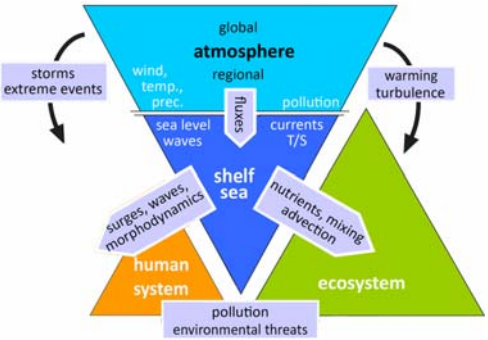
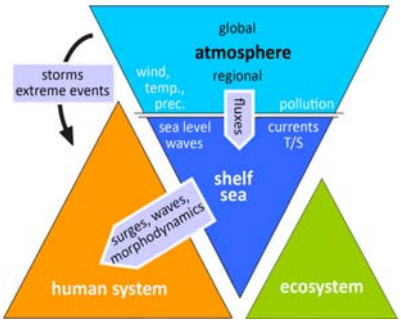
Topic 2: Fragile coasts and shelf seas – the natural sciences domain

What are drivers of variability, both human and natural, in coastal and shelf sea systems?



Topic 4: Bridging research and society – the interface to the human system

How can knowledge effectively be transferred from science to society by provision of products, tools and multifaceted climate services?



Interactions and synergies in PACES II and beyond

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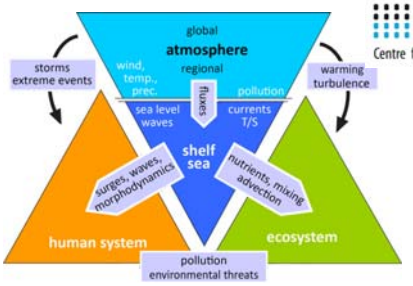

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- geophysical, biogeochemical sciences
- regional Earth System modeling
- observing systems
- data systems, data portals
- information and services

- biological sciences, ecosystem
- time series observations
- polar coastal research

HELMHOLTZ
RESEARCH FOR GRAND CHALLENGES

MOSES (modular observatories)
REKLIM (regional climate)
Earth System Modeling
Earth System Knowledge Platform

Universität Hamburg
DER FORSCHUNG | DER LEHRE | DER BILDUNG
Helmholtz-Zentrum Geesthacht
Zentrum für Material- und Küstenforschung
Max-Planck-Institut für Meteorologie
DKRZ
DEUTSCHES KLIMARECHENZENTRUM

Cluster of Excellence **clisap** (2007-2017)

Excellence Strategy *Climate, Climatic Change, and Society* (proposed, 2019 -)

HZG Research Units in PACES II

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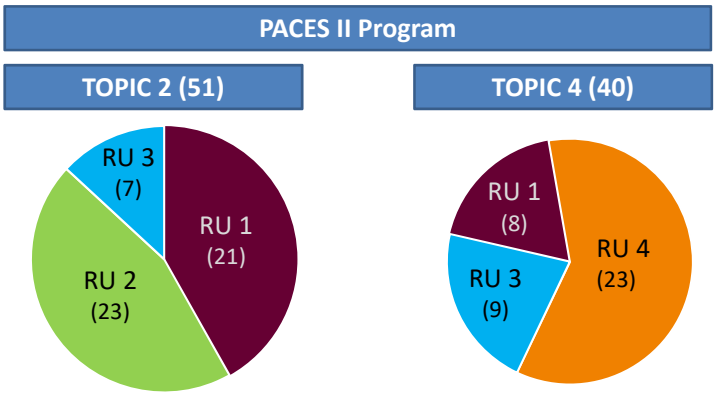

Core-financed scientists 2016 (FTE)

RU 1: System Analysis and Modelling
RU 2: Biogeochemistry in Coastal Seas
RU 3: Operational Systems
RU 4: GERICS

Accounting for PACES II

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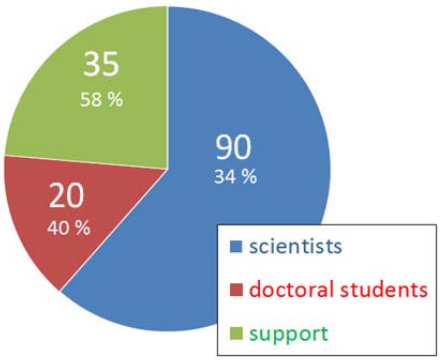
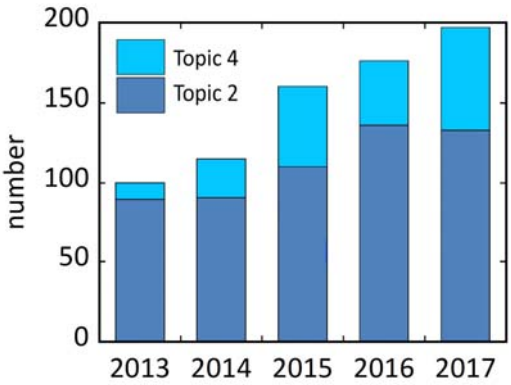
personnel 2016 (FTE)



publications (ISI/SCOPUS)



2013-2017: 64 successful PhDs
2017: 30 doctoral candidates
(core and externally funded)

The value chain in three examples

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PACES II theme	observe	model	inform
regional climate change			
wind farms			
weather extremes			

RU1
RU2
RU3
RU4

Informing climate policy and decision-making

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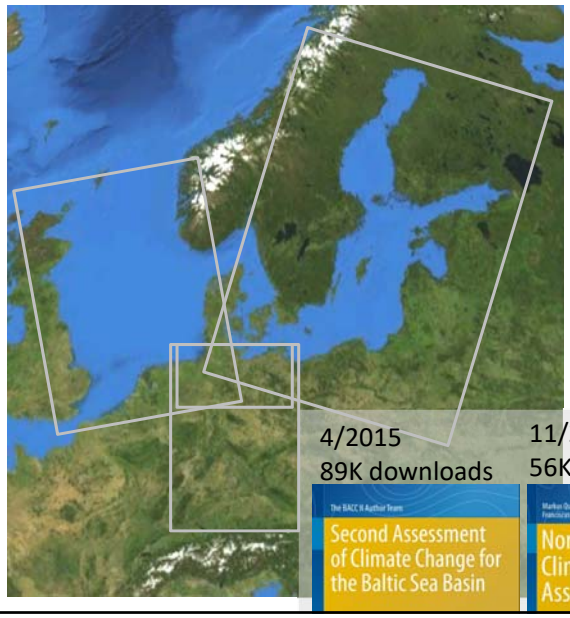

- document agreement, disagreement and knowledge gaps on climate, climate change and impacts on regional systems
- international author groups, peer-reviewed, highly disseminated
- basis for future strategies (HELCOM, regional and national governments and agencies)

Leading and consensus reports on regional climate change and its consequences

4/2015
89K downloads

11/2016
56K downloads

11/2016
384K downloads

10/2017
10K downloads

The North Sea – front runner of global shelf sea industrialisation

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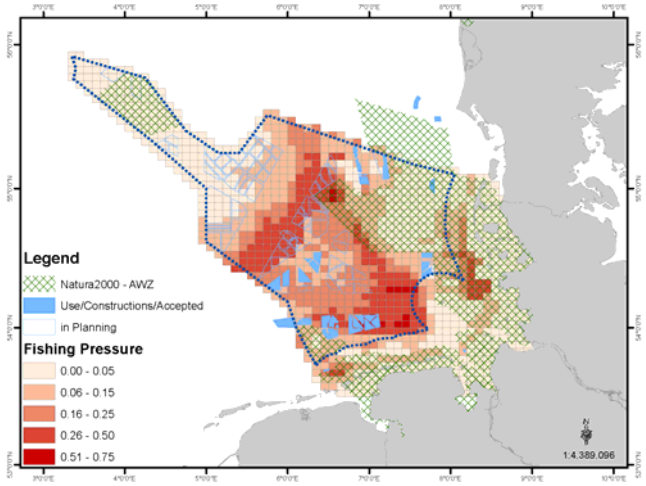

emerging theme in PACES II: wind farming on 1/3 of area of German EEZ (equivalent to six decommissioned NEU)

HZG develops and provides observations, models, and tailored information for low-risk conversion of shelf sea space to a multiple-use social-ecological system

Wind farms

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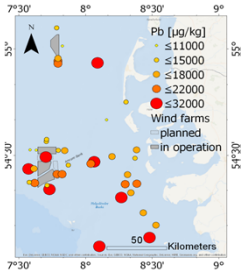
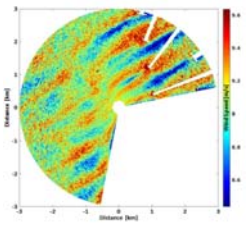
observe

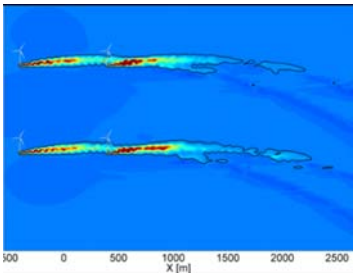


pollution monitoring

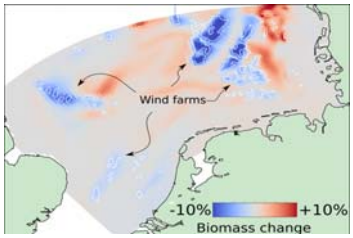


radar wind gust prediction

model

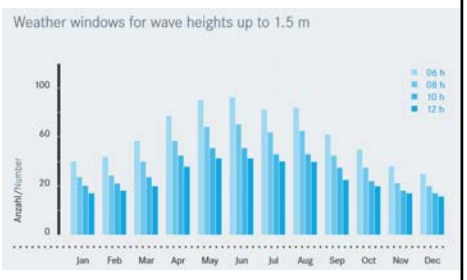


turbulence, scour, transports



expected ecosystem effects

inform



construction, servicing windows

refinancing wind energy under climate change impacts

Extreme weather, changing seasonality

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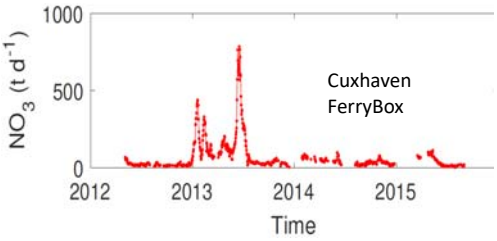
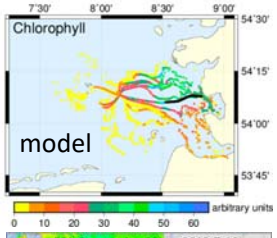
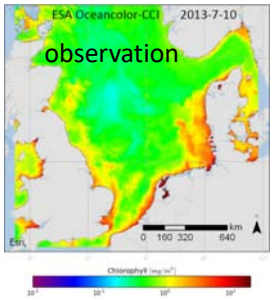
hydrological extremes will increase



massive nutrient (and pollutant) loads at unusual time, stratification

chlorophyll trace of spreading plume





Setting agenda for theme regional catchment-sea continua under natural and human pressures

COSYNA MOSES ESM ESFRI PL ROADMAP 2016 DANUBIUS-RI

Networks

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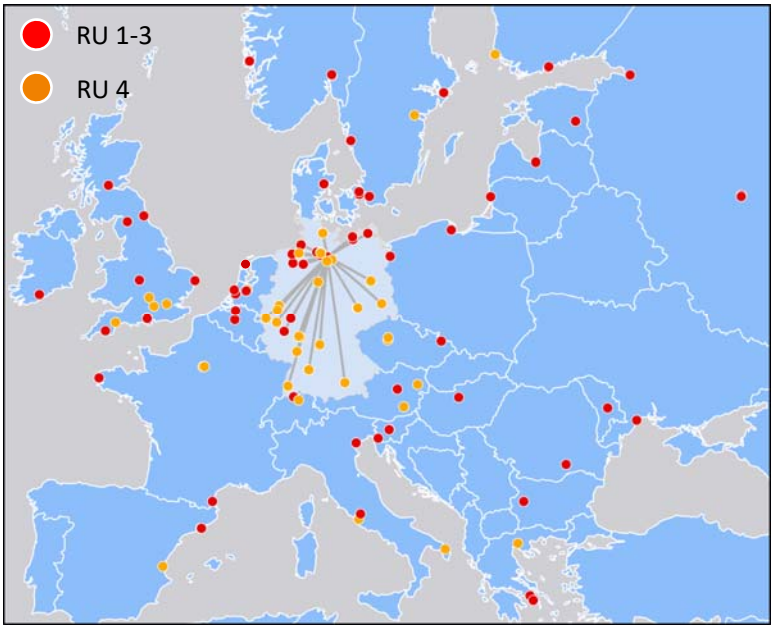
EURO-CORDEX

Baltic Earth

DANUBIUS-RI



Networks

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EURO-CORDEX

Baltic Earth

DANUBIUS-RI

Climate Services Partnership

THE EARTH LEAGUE

LOICZ

Distinct profile in geophysical, geochemical coastal research, in science services (climate, coasts) is unique, recognized, and attractive for partners, users, and the public

Summary and outlook

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Key advances made

- unique and end-to-end observing and modeling infrastructure
- consequences of land-sea interaction and sea-space conversion for coastal systems
- regional climate and climate change impacts from the past to the future
- sustained dialogs and interactions with users and stakeholders

Strategic initiatives and interactions

clisap

CliCCS

ESM

MOSES

ERA-PLANET

Copernicus

THE WORLD BANK

United Nations Framework Convention on Climate Change

WCRP World Climate Research Programme

Future research focus (land-sea transition zones under natural and human pressures)

- builds on past successes and leverages specific strengths
- bridges the gap between terrestrial and marine research
- addresses Earth System Grand Challenges and UN Sustainable Development Goals (6 – clean water, 11 – cities , 13 – climate action, 14 – life below water)